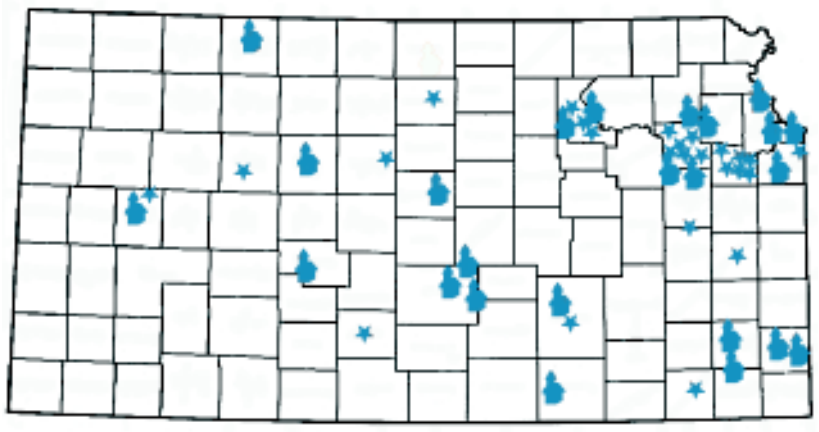
Kansas Corporation Commission
Kansas Energy Office
2005 Annual Report

From the Chair

Energy is a front-page headline in our state and nation's newspapers. Energy resources are being strained to meet an ever-increasing demand both nationally and internationally. Recent natural disasters have damaged some of our refineries and distribution systems. Citizens wonder what can be done to control their utility bills and maintain their standard of living. Others are wondering, given the current energy climate, how to promote the use of alternative energy sources.

Kansas government's window to its citizens on energy information is the Kansas Energy Office (KEO). The KEO provides leadership in energy education, energy efficiency upgrades for public buildings, education in renewable energy and alternative fuels, and assistance in answering everyday energy questions. The KEO is a valuable resource for all Kansans.



2005 Energy Office Grants
FCIP Projects (to date)

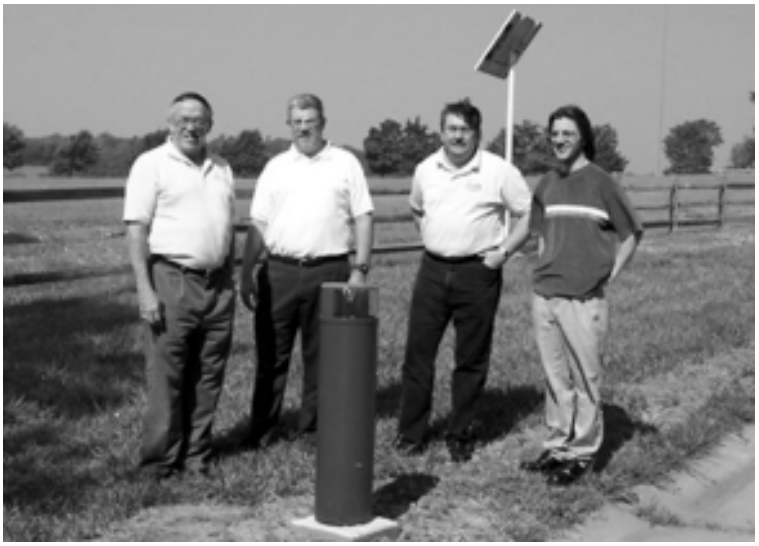
One of the most important KEO programs this year has been the Facility Conservation Improvement Program (FCIP). Under the FCIP; the state, counties, cities and school districts can upgrade their facilities and HVAC systems to current efficiency standards without increasing their operating budgets. Every Kansas citizen benefits from the FCIP. Other KEO supported programs, such as Kansas State University's Kansas Energy Extension Service and Kansas University's Kansas Energy Information Network, are providing comprehensive energy information reflecting the latest developments and technology. This annual report highlights the accomplishments of the KEO in FY2005, advancing energy efficiency and conservation benefiting all Kansans through responsible management of our natural resources. Thank you to the staff of the Energy Office and everyone who participated in this year's programs.

Brian Moline, Chair
Kansas Corporation Commission

Overview of the Kansas Energy Office

The Kansas Energy Office (KEO) is the interface for Kansas citizens with their state government on energy matters. The KEO provides funding for energy education projects, like solar racing, the education of science teachers through Project Learning Tree, general populace education through the Energy Conference, and special education projects, like biodiesel and ethanol outreach programs. The KEO initiates demonstration projects that improve the state's infrastructure, like solar lighting at state parks and the Governor's residence. The KEO also funds special energy studies, such as FutureGen and the effects of trading renewable energy credits in Kansas. A summary of projects funded in 2005 can be found on the inside pages.

Perhaps the most important initiative of the Energy Office is the Facility Conservation Improvement Program (FCIP). The FCIP facilitates upgrading and improving public buildings though guaranteed energy savings provided by the upgrades. State and county agencies, cities, municipalities and unified school districts are eligible for this program. If your city or school district could use these savings, read more on the FCIP in the inside pages then contact the KEO.



The Kansas Energy Office staff is shown with part of the new PV installation at Cedar Crest, in Topeka. (From the left) Jim Ploger, Energy Office Director; Dale Worley, FCIP Manager; Jerry VanAllen, Assistant Energy Director; and Ryan Freed, Energy Office Intern.

Facility Conservation Improvement Program

Program Targets Energy Savings in Public Facilities

The Facility Conservation Improvement Program (FCIP) is a program initiated to streamline upgrading existing structures of state agencies, municipalities, counties and public schools. Large savings can be generated with certain improvements in facilities. Many building owners see energy savings of 15-35% and also reduce their long-term maintenance costs. The customer uses these savings to pay for the costs of the improvements.

First, the Energy Service Companies (ESCO) will do an initial walk through audit of the facilities to determine feasibility; then, the ESCO, who has been pre-approved by the state, will identify and evaluate energy-saving opportunities (Investment Grade Audit) and recommend a package of improvements to be paid for through savings. The ESCO will guarantee that savings meet or exceed annual payments to cover all project costs (Performance Contracting). The contract term is usually seven to ten years (Kansas law allows a maximum of 20 years). If savings do not materialize, the ESCO pays the difference, not the contractee. To ensure the savings, the ESCO offers staff training and long-term maintenance services. Many types of building improvements can be funded through your existing budget: new lighting technologies, boilers and chillers, and energy management controls to name a few.

Performance contracting offers a streamlined approach to making facility improvements. With a single contract you can tackle multiple energy-efficiency projects throughout your facility, rather than doing them one project at a time. The ESCO can provide a full range of services, including arranging for financing, and working with you once the projects are complete to ensure that you get optimal long-term energy performance.

FCIP Features

1. Funding can be arranged for your particular project in a matter of days rather than months.
2. Conservation projects are not limited strictly to energy. Savings from water, maintenance, labor, etc. may be considered when determining economic justification. In other words, reductions in all operating costs may be used for debt service.
3. Economic justification should also consider revenue increases. If a project results in an increase in revenue to the agency, then this revenue may also be used in the economic justification for a project, e.g. if new and better lighting allows an area to be used for additional programs, the revenue increase generated by those programs can be considered as part of the economic justification of the project.
4. Savings accrued beyond debt service needs can be used to fund additional conservation projects, which will generate even more savings.

Conservation projects are a smart choice for all public agencies because they can accomplish the goals of upgrading capital equipment, providing for maintenance or improvement of existing facilities, improving the comfort and safety of your fellow employees, saving energy, saving resources and saving money.

With utility bills being major budget items, reducing consumption reduces utility bills, thereby generating savings. Also, upgrading or replacing obsolete equipment can reduce maintenance costs. When the lease matures, you continue to benefit from the savings.

In addition, many benefits accrue to the community at large as these projects reduce demand and help to delay the need for developing new generation plants. Reduced greenhouse emissions and the replacement of ozone-depleting CFCs with ozone-friendly refrigerants have great benefits to the environment. Upgrading public facilities sets an example for private citizens to do likewise with their residences and private businesses and helps reduce the tax burden on all citizens.

Why Use an Energy Service Company? (ESCO)

A qualified ESCO can help you put the pieces together:

- **Identify and evaluate energy-saving opportunities,**
- **Develop engineering designs and specifications,**
- **Manage the project from design to installation to monitoring,**
- **Arrange for financing,**
- **Train your staff and provide ongoing maintenance services,**
- **Guarantee that savings will cover all project costs, and**
- **Saves the time and cost associated with producing an RFP.**

Technically speaking, energy conservation measures help reduce energy consumption, streamline facility operations, improve equipment safety, and help comply with government regulations. Most importantly, energy conservation efforts reduce the total cost of operation at a facility, releasing funds for use in other budget areas.

To find out more, or to apply for the FCIP program, contact the Kansas Kansas Energy Office, 785-271-3184, or j.vanallen@kcc.state.ks.us.

FCIP Projects

Kansas State School for the Blind

Kansas City, KS

Through a performance contract with the ESCO, TAC Americas, the Kansas State School for the Blind (KSSB) in Kansas City, Kansas, was able to use guaranteed energy savings to fund the much-needed replacement of HVAC, controls and lighting in their facilities. KSSB, like many state agencies, was experiencing inefficiency associated with outdated equipment, while having no access to new capital.

By implementing both a campus-wide lighting retrofit and an Energy Management System, TAC was able to improve existing facilities, solve comfort problems, and generate significant energy savings. Due to KSSB's visually impaired learning environment, painstaking accuracy was used in developing correct lighting levels. Additional improvements were the replacement of three water heaters, replacement of a boiler, replacement of two laundry dryers, the insulation of a heat exchanger and the installation of an automatic pool cover.

The total cost of this project was $446,000, with a guaranteed annual savings of $44,519. Projects like this not only provide the savings to fund their completion, but also improve the learning and teaching environment for students and faculty.

Buhler USD 313

Buhler, KS

The first school district in Kansas to use the FCIP was Buhler USD 313. The project encompassed seven buildings and 588,259 square feet. With the assistance of the FCIP, the district was able to upgrade lighting systems, install an energy management system, replace a failing boiler and chiller system in the middle school and implement water conservation measures.

The ESCO, Custom Energy Services, guaranteed the school district annual savings of 1,157 MCF of natural gas, 822,320 kWh of electricity and 86 thousand gallons of water. This translates into over $67,000 per year in savings in today's dollars. If the price of energy escalates, as many forcasters project, actual savings will be even greater.

The Buhler Grade School Gymnasium is now well-lit, warm and comfortable.

The local community and taxpayers also stand to benefit from this unique contracting approach. The use of regional contractors and vendors results in work being created where none existed previously. The program also allows current taxpayer dollars to be used to greater effect, instead of requesting additional funds.

"Taxpayers have reason to appreciate efforts by Buhler USD 313 to save energy…District administrators deserve credit for working with the consultants to save enough electricity to pay for the replacement equipment."

...Hutchinson News

In talking about the dollars and cents of the project, it is easy to forget what these upgrades mean to people who use the facilities on a daily basis. The learning and teaching environment will be more comfortable and well-lit year-round, which should lead to a better quality of education and improved teacher retention. The FCIP also caught the eye of the Hutchinson News which ran two articles praising the Buhler School District's efforts at energy savings.

Facility Conservation Improvement Program

Pittsburg State University

Pittsburg, KS

Pittsburg State University completed its first FCIP project in 2003. They were so pleased with the results, they completed a second FCIP project this year. This project focused on the circa 1950's Nation Hall Dormitories. The piping in the facilities had outlived its useful life and was leaking. Not only did this cause uncomfortable living conditions, but it also wasted energy and contributed to exorbitant maintenance and utility bills.

The ESCO, Custom Energy, recommended replacing domestic, waste and hot/chilled water piping; the unit vents that heat and cool each dormitory room; the building's hot water heaters; and, the bathroom shower valves. The Nation cafeteria also services other dormitories on campus, so valves were installed to isolate it from the rest of the building when it was the only area of the building in use.

The benefits are much more comfortable rooms, warmer showers in the winter and, of course, the energy savings that are guaranteed with each project. The $1.5 million project will result in annual energy savings of 76,000 kWh electricity and 36,700 Therms of natural gas.

Burrton USD369

Burrton, KS

Located 15 miles east of Hutchinson, Burrton USD 369 is spread out over 86 square miles and supports a student body of 300 with 50 employees. Despite its modest size, Burrton's proactive school board and superintendent were determined to find a solution to repair their leaking roof and improve aging infrastructure within the district.

Although the district prides itself on maintaining a quality learning environment, some of the major heating/cooling equipment had outlived its useful life. Operating the older equipment was putting the district at risk by causing the district to incur unnecessarily high utility bills. In addition, some areas in the schools had not been upgraded to support newer standards.

Capital funds had been set aside, but implementing all the necessary improvements within the district would stretch past what was available. The ESCO, Johnson Controls Inc., proposed an energy solution that would enable the district to utilize the FCIP with its guaranteed energy savings to pay for system renovations.

Last year, operation and maintenance of public school buildings cost Kansas taxpayers $360 million. If all public school facilities were improved, an estimated annual savings of $29.8 million could be realized.

....Department of Education & ESCO studies

Energy-efficient automation was installed and lighting fixtures retrofitted in all the buildings. Chillers and boilers at the high school were repaired as well as the leaking roof at the elementary school. Ceiling and lighting improvements were made in the commons area and band room, and the gymnasium was upgraded to improve comfort levels during large events. Over $400,000 of needed improvements were completed and energy costs were reduced by over $30,000 per year.

Scott County USD 466

Scott City, KS

The 20-year old Scott City Elementary School was rapidly needing major upgrades for its aging HVAC system. Some areas of the school were always cold while others were always hot. The kindergarten and district offices still had lighting fixtures from the 1930's.

Through participation in the FCIP, Scott County USD 466 replaced failing heat pumps, rooftop units and window air-conditioning units in the elementary school, all which were past their useful lives. A problem with the cooling tower water freezing was resolved though the installation of an indoor cooling tower sump. This allowed the existing heat pump system to provide heating to interior spaces. Lay-in ceiling insulation was added, and the outdated steam heating system was replaced with forced-air HVAC. The kindergarten and district offices received a badly needed lighting system upgrade. In all, five buildings were upgraded during the project.

The ESCO guaranteed the school district annual savings of 655 MCF of natural gas, 438,690 kWh of electricity and 55 thousand gallons of water. The projected $45,000 in savings will pay the principal, plus the debt service, on the $945,000 project. It is still too early to quantify the actual annual savings, but Superintendent Dean Katt says that students, teachers and staff are all very pleased with their new surroundings.

Kansas FCIP Projects

(Completed through September, 2005)

	Agency	*Area (Sq. Ft.)*	*Project Amount*	*Annual Savings*
1	Kansas School for the Blind	1,112,689	$ 467,153	$ 44,519
2	Hutchinson Correctional Facility	424,030	$ 2,355,000	$ 332,196
3	Pittsburg State University	1,379,549	$ 4,500,000	$ 358,975
4	University of Kansas - Campus	5,881,330	$ 18,393,010	$ 1,723,488
5	Kansas State University - Housing	1,080,981	$ 2,418,169	$ 356,097
6	Kansas Neurological Institute	414,539	$ 2,268,817	$ 177,764
7	University of Kansas Medical Center	1,912,889	$ 12,500,000	$ 964,768
8	Kansas State University - Campus	5,532,479	$ 21,090,000	$ 1,629,935
9	Parsons State Hospital	394,618	$ 2,058,435	$ 194,542
10	Winfield Correctional/ Wichita Work Release Facilities	282,057	$ 1,425,639	$ 215,500
11	Norton Correctional Facility	308,150	$ 1,682,971	$ 189,000
12	Lansing Correctional Facility	716,157	$ 3,583,697	$ 445,736
13	Fort Hays State University	1,839,022	$ 4,689,072	$ 348,816
14	Kansas School for the Deaf	243,108	$ 1,016,810	$ 95,151
15	El Dorado Correctional Facility	609,431	$ 2,123,556	$ 220,610
16	Ellsworth/Larned Correctional Facility	333,003	$ 1,176,125	$ 131,825
17	Topeka Correctional Facility	245,069	$ 887,985	$ 96,252
18	City of Topeka - City Hall & Law Enforcement Center	282,220	$ 347,260	$ 34,904
19	USD #313 Buhler	588,259	$ 1,166,186	$ 67,128
20	USD #466 Scott County	145,569	$ 945,271	$ 50,072
21	Neosho County Community College	91,911	$ 2,064,361	$ 70,704
22	Pittsburg State University - Housing	232,009	$ 1,550,401	$ 60,425
23	USD #369 Burrton	190,608	$ 432,284	$ 33,940
24	Kansas Insurance Department	36,000	$ 692,419	$ 83,143
	CUMMULATIVE TOTAL	**24,275,668**	**$ 89,834,621**	**$ 7,925,490**

Neosho County Community College

Neosho, KS

Neosho County Community College was the first institution in the state to receive a grant from the Energy Office to fund an Investment Grade Audit for the FCIP. The audit identified $2.1 million in energy efficiency improvements that will save the school $70,704 annually. Some common areas identified were lighting system upgrades, a new energy management system, roof replacement and water conservation. Work started in April and was completed before students returned in the Fall.

Of particular interest in Neosho was the remodeling of the school library's basement, known on campus as *The Cave*. It is a cluster of offices and classrooms used beyond their capacity and recently closed down by the fire marshall. *The Cave* received a new sprinkler system, fire egress hallway and fire alarms among other improvements. New environmental controls keep all areas at comfortable temperatures. The entire project was paid for by energy savings generated by the improvements.

State Energy Grants

FCIP $10,000 Incentive

Over the past two years, the State of Kansas has made great strides toward reducing energy consumption and improving state facilities through the FCIP initiative. Now, the Kansas Energy Office has received approval to partially fund the Investment Grade Audits (IGA) portion of the program for municipalities and school districts. This audit is required before entering into an energy savings performance contract. This financial assistance will cover 50% of the IGA cost, up to $10,000. These limited funds are payable upon entering into an Energy Savings Performance Contract with a pre-qualified ESCO participating in the FCIP.

Currently, nearly 21 million square feet of State buildings are being made more energy efficient through the FCIP. This represents $80 million in work and will save the state over $7 million per year in annual utility expenses.

Governor Kathleen Sebelius presented a $10,000 incentive award to representatives of Buhler USD 313 for having the initiative to improve the energy efficiency of school buildings through participation in the Facility Conservation Improvement Program administered by the KCC. Also receiving incentive awards were Scott County USD 466 and Burrton USD 369. KCC's Executive Director, Susan Duffy, (second from right) and FCIP Manager, Dale Worley, (fourth from right) joined in the event.

Governor Sebelius also signed a proclamation proclaiming the 2005-2006 school year as "School Energy Efficiency Awareness Year." The proclamation calls upon all Kansas unified school districts to become energy conscious and reduce energy consumption and costs through conservation measures.

Energy Education

Energy Extension Service

Kansas State University
Manhattan 785-532-6026

Engineering Extension at Kansas State University celebrated its 25th year of service to Kansas energy consumers. KSU's Energy Extension is the state leader in providing technical assistance and educational outreach regarding energy efficiency, conservation and renewable energy. Technical assistance to the state involved public presentations, telephone assistance, and a continual upgrading of the Engineering Extension web site, **www.engext.ksu.edu**, to provide the latest energy and environmental information to the public.

Helpful tips from the Energy Extension Service on saving energy and lowering your utility bills at:
www.engext.ksu.edu

In FY2005, Engineering Extension was actively involved with a variety of energy projects that involved providing numerous types of information to private citizens and public organizations involving energy use and production on a global, national, state, and local scale. There were over 350 assistance requests involving residential insulation, moisture concerns, wind energy, ethanol plant development, and greenhouse gas emissions. Five new *Ask Energenies*, a weekly question-and-answer column designed to provide home owners and small business operators information they can use to make their homes and commercial buildings more energy efficient, were developed. *Ask Energenies* were mailed to 75 newspapers each week. Topics ranged from residential insulation to fuel cells to the hydrogen economy to energy-efficient window choice. Seven interviews were performed with a number of Kansas radio stations and newspapers relating to residential and renewable energy. Targeted public energy awareness educational engagements were developed and presented to two KSU classes, a KSU intersession course on energy and the environment, Resource Conservation and Development Districts, the Kansas Energy Council, the Kansas Board of Regents, Western Governors' Association, and to KSU Cooperative Extension agents. Minor web site updates and additions were made in the energy efficiency and renewable energy sections.

Kansas Energy Information Network

Kansas University Center for Research
Lawrence 785-864-2073

The Kansas Energy Information Network (KEIN) went on-line in 2001 to promote energy efficiency, renewable energy and a better understanding of energy issues by making reliable information available to the public. One of the goals of KEIN is to be the first stop on the internet for those who seek Kansas energy information. Located at **www.kansasenergy.org/kein.htm**, KEIN includes the official web site of the Kansas Energy Council (KEC).

The KEIN web-site provides users easy access to energy information, including current news and events, and resources relevant to Kansans. Renewable energy and energy efficiency are the primary focus of KEIN, though information on all energy resources can be found on the web-site.

Citizens can stay up-to-date on renewable energy production in Kansas with the latest maps showing existing, proposed, and under-construction wind and ethanol projects, check up-to-the-minute prices for gasoline, oil and natural gas and find the latest energy related articles published by newspapers around Kansas. The site is also a good starting point for links to county guidelines for wind development, energy efficiency suggestions for your home, and retail outlets for renewable energy technologies. Bike trails, bus lines and even light rail alternatives are included on the web site.

Formula Sun Raycing

New Resources Group
Freeman, MO 877-840-5511

Formula Sun is a group of racing events encouraging study and advancements in solar vehicle technologies. The races include the Formula Sun Grand Prix, the Solar Bike Rayce and the North American Solar Challenge. These events are open to anyone, but most of the entries are from high schools, colleges, and universities. The Kansas Energy Office sponsors these events to help encourage students to study renewable energy and to help them consider future careers in renewable energy fields.

The Formula Sun Grand Prix is an international closed-course race for solar cars. There were two competitions in 2005. The first event was held at Heartland Park in Topeka in May. The second event was in Texas in July. These races were also the qualifying events for North American Solar Challenge 2005.

Iowa State University's solar car shown driving at highway speeds through Oklahoma during the North American Solar Challenge (photo by Stefano Paltera).

The North American Solar Challenge is the world's longest solar car race. It is a competition to design, build and race solar-powered cars in a cross-country event. Teams competed in a 2,500-mile open-road race from Austin, Texas to Calgary, Alberta. Cars must have many of the same features as your family car to make them road-worthy, such as turn signals, horns, seatbelts, and, of course, brakes. This year's winner was the University of Michigan whose car traversed the course in 53:59:43, an average speed of over 46 mph. Kansas State finished 14th.

The Solar Bike Rayce is an annual international closed-course solar bike race held at Heartland Park, Topeka. This event attracts many

K-State students working on their car, Paragon, in Weatherford, Texas on day two of the North American Solar Challenge. The top of the car containing the solar array can be seen behind the students(photo by Stefano Paltera).

State Energy Grants

high schools and private teams from across North America. The A/B/X class was won by Bloomington High School South with an average speed of 23.98 mph. S-class was won by the Thompson Family of Wichita with an average speed of 23.06 mph.

If you are interested in entering a vehicle, or if you want more information on the solar race competitions, see **www.formulasun.org** or **www.americansolarchallenge.org**. Volunteers are always needed and appreciated for the Solar Bike Rayce. You can contact the Kansas Energy Office, 785-271-3170, for more information.

Project Learning Tree

Kansas Association for Conservation & Environmental Education
Manhattan 785-532-3322

The Kansas Association for Conservation and Environmental Education (KACEE) was successful in providing energy education training and materials to 244 educators throughout the state of Kansas in FY2005. Participants included teachers, non-formal educators and pre-service teachers.

In addition, KACEE staff made an Energy Education Presentation at the *Kansas Environmental Education Conference* for more than 30 participants. The conference included an energy education strand, "Adding Energy to Your Classroom" with 4 concurrent sessions on energy education and a field trip to the Montezuma Wind Farm.

Working toward advancing energy education in Kansas schools and communities, KACEE began work on three pilot projects. The first pilot involved the development of a school-based energy fair coupled with professional development for staff. KACEE worked with the Kennedy Elementary After-School Program to host an Energy Extravaganza in Lawrence on May 10, 2005. Included in the event were hands-on activities from the Project Learning Tree (PLT) Curriculum Guide and the PLT Energy and Society Kit. They also received Energy Hog Challenge Student Guides to take home and share with their parents. The program staff received a PLT Energy and Society Kit and Energy Hog Teacher Guides. The highlight of the event was a visit from the Energy Hog! After demonstrating to students several ways to waste energy in the classroom, the Hog was booed and voted out by the students, so they could learn to use energy wisely.

Additional pilot projects include development of a Community Energy Fair, followed by an educator workshop. The first Community Energy Fair is scheduled for Pratt, Kansas in Spring 2006. A final pilot project is the development of an Energy Summer Institute for educators. While a workshop was planned and promoted, enrollment was very low. It was determined that KACEE will work directly with contacts at the Wolf Creek Nuclear Operating Corporation to host a workshop specific to elementary/middle school educators in 2005-06 and offer the course for graduate credit. KACEE believes they will be able to increase interest and involvement in the Energy Summer Institute and are already working on development and promotion of the Institute.

At the Kennedy Elementary After-School Program in Lawrence, the Energy Hog was booed and voted out of the classroom by the students after demonstrating several ways to waste energy.

Coming this year, KACEE is developing a guidebook for community members/educators on how to organize and host an energy fair in their communities. This is based on the extensive expertise of KACEE's Water Celebrations planning committee work and modified to change the theme from water to energy. They believe this will be an invaluable tool to initiate energy fairs in communities—KACEE currently has more than 60% of the counties in Kansas participating in Water Celebrations, they hope to be able to have similar success with Energy Fairs.

KACEE is also in the process of developing a school-based Energy Audit that will be posted on the KACEE website, **www.kacee.org**, in a special energy education link. It will include the use of measurement tools that can be obtained for low cost and that will support the attainment of Kansas Curricular Standards in Math and Science.

Over the last few years, KACEE has dramatically increased the number of projects and activities that it sponsors and/or coordinates. Now, more than ever, the success of this organization in reaching its vision of an environmentally literate Kansas citizenry.

KACEE is dependent on the work of volunteers. By putting your special skills and talents to work for KACEE, you will play a vital role in ensuring the children of today become the critical thinkers and informed decision-makers of tomorrow.

Become involved---VOLUNTEER.

Kansas Energy Office Annual Report

Pinnacle Technology
Lawrence 785-832-8866

Pinnacle Technology was hired by the KEO to prepare the Annual Report that you are currently reading. Pinnacle collected information from all the grantees during fiscal year 2005, summarized the activities of the grantees, and produced an easy-to-read report highlighting all the activities undertaken by the KEO during the year.

Buildings

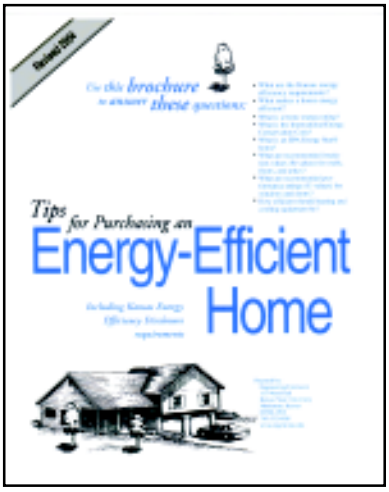
Codes & Standards

Kansas Building Science Institute
Manhattan 785-537-2425

The Kansas Building Science Institute (KBSI) was founded in 1996 to provide building science and energy performance training for the weatherization, home energy rating, utility, and building trades. KBSI conducts home energy rater certification training accredited by the Residential Energy Services Network (RESNET). KBSI has trained and certified energy raters in more than 30 states.

In FY2005, the Kansas Building Energy Code project continued to assist engineers, architects, and builders understand and follow Kansas' adopted building energy codes. Commercial building stakeholders including engineers, architects, local code officials, and contractors were notified of the Kansas statute update to IECC 2003. Workshops on the commercial provisions were coordinated with the Heart of America International Code Chapter and Johnson County Building officials.

The brochure, *Tips for Purchasing an Energy-Efficient Home*, was updated to include changes included in IECC 2003 and expanded to include beyond-code compliance issues. These included a discussion on achieving real energy efficiency, home energy ratings, and Energy Star®. In addition to the Tips fact sheet, a second publication, *Home Energy Ratings*, was produced to highlight the benefits of home energy ratings as a means of achieving higher performance. Home Energy Field Days were conducted to demonstrate to builders the Home Energy Rating process and demonstrate house and duct tightness testing performed as part of a rating.



Numerous pamphlets to help the consumer battle the high cost of energy are available through the KBSI.

Transportation

Kansas State University Solar Car

KSU Foundation
Manhattan 785-532-5506

The KSU Solar Car Racing Team is a student-run organization consisting of about thirty students that design, build, and race solar powered cars. There is a strong emphasis on the educational aspects of the project as students are exposed to a broad range of business and engineering disciplines. Frequently, students learn about subjects long before they are taught in class and gain real world skills that cannot be taught in the classroom. The solar car gives them the opportunity to see their ideas move from the design room to the pavement of America's highways in less than two years.

Paragon is the latest in the series of solar cars designed and raced by the KSU Solar Car Team. It follows Solution, Apollo and Catalyst in a series of successful racing-machines. Paragon is lighter and more aerodynamic than its predecessors. After two years of research and planning, building Paragon finally commenced. Machining and construction of molds was the major project for the year. Team members made

The past and the future are in stark contrast when the crew of the K-State Solar Car, Paragon, stops for a lunch break at an abandoned house and barn during a test drive.

trips to Wichita to help with the machining and spent 40-hour weekends doing mold lay-ups. Late nights and early mornings were common for the array and battery systems. Once the team decided on types of cells and batteries, they immediately worked to adapt them to meet their specific needs. The team was very excited to purchase cells and batteries that are higher quality than previous investments.

This summer, the team competed in the North American Solar Challenge, **www.americansolarchallenge.org**. The teams raced 2,495 miles from Austin, Texas up Highway 75 to the Trans-Canadian Highway, then West to Calgary, Alberta, Canada. The KSU Solar Car Team completed the entire race and finished 14th.

Team advisor Dr. Norm Dillman recently retired from teaching at K-State. He and his wife Phyllis were with the team since its inception. Dr. Ruth Miller of the Department of Electrical Engineering is the new faculty advisor to the KSU Solar Car Team. The Solar Car is a campus-wide project open to students from all majors throughout the university. The project is funded by the grant from the Energy Office and by many other generous sponsors who have contributed materials, time and knowledge, as well as money, to the success of the Solar Car.

Not only does the team race, but they also show the car at various parades, car shows and other events across Kansas. They are truly goodwill ambassadors for renewable energy. You can find out more about KSU Solar Car Racing at **www.ksusolarcar.com**.

Kansas City Regional Clean Cities Coalition

Metropolitan Energy Center
Kansas City, MO 816-531-7624

During FY2005, the Kansas City Clean Cities program hosted meetings with various organizations such as the Kansas Corn Growers, Kansas Soybean Association, Mid-America Regional Council of Governments, Greater Kansas City Chamber of Commerce and Clean Cities members and stakeholders to develop commitments for alternative fuel corridor refueling and incentives. A total of 12 meetings and events were held.

The Kansas Corn Growers and Kansas Soybean Association recommended refueling infrastructure sites as having the best potential for establishing corridors for the traveling fleets and public. Olathe, Kansas City, Wichita and Overland Park offered the highest potential in Kansas.

The Kansas City Clean Cities program also worked with an alliance, Green Fleets, to start developing additional favorable alternative fuel incentives for the state. Green Fleets is a program for improving air quality and greenhouse gas emissions by decreasing the emissions of fleet vehicles and is sponsored by the International Council for Local Environmental Initiatives.

During this period, coalition stakeholders attended openings for one E-85 (ethanol) refueling site in Garnett and one B-20 (biodiesel) refueling site in Topeka. The coalition and stakeholders have been active participants in the various community organizations working to develop strategies for EPA's one-hour air quality standards. Monthly meetings were held and hosted for this effort.

Biodiesel Education Program

Kansas Soybean Association
Topeka 785-271-1040

The number of additional off-road retailers handling biodiesel increased this year, but at a slower pace than in the past. This is a natural occurrence, as the saturation point of bulk retailers is being reached. Retailers increased, especially on-road retailers, as the federal tax incentive passed by Congress took effect January 1, 2005. This prompted many new retailers to put biodiesel in their product line. The volume of biodiesel being sold is increasing.

The Kansas Petroleum Marketers Association and their individual members are increasingly receptive to handling and marketing biodiesel, and they have distributed information on biodiesel prepared by the National Biodiesel Board to their members. The Kansas Soybean Association (KSA) used the regional PACE meeting in Kansas City and the National Biodiesel Conference in Ft. Lauderdale, Florida to further educational efforts with the Petroleum Marketers of Kansas.

Customers fill up with an on-road B-2 blend of biodeisel at Bird Oil Express Station, 1000 Main Street, Great Bend.

During this project, the number of bulk off-road biodiesel retailers increased from 137 to 163. The number of at the pump on-road biodiesel retailers increased from 17 to 29. To be considered a biodiesel retailer, an outlet must handle blends of 2% and higher in bulk, or at the pump.

KSA feels there may be more retailers than reported, as not all of them are aware KSA keeps listings of biodiesel marketers.

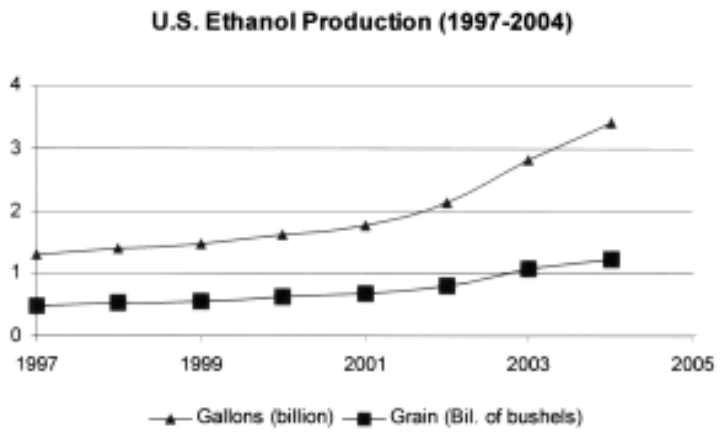
This continuing project has been highly successful in increasing the market share of biodiesel and KSA has enjoyed working with the KEO to expand alternative fuel use in Kansas by increasing the availability and knowledge of biodiesel to the general populace.

Ethanol Outreach Program

Kansas Corn Commission
Garnett 785-448-6922

The Kansas Ethanol Outreach Project utilizes the Kansas Corn Commission's existing ethanol promotional program and employees to save time and money. The grant received through the Kansas Energy Office allowed the program to increase the number of consumers; fuel retailer and marketers the Kansas Corn Commission could work with on a daily basis. The success of the program is seen in many ways, but the simple increase in the number of retailers offering ethanol-blended fuels and increased use of those fuels highlights the program's accomplishments. The use of E10 increased nearly 100%, and the use of E85 increased as much as 250% during FY2005. The Kansas Corn Commission hopes their relationship with the Energy Office will be there to continue assisting the expansion of this renewable, domestic fuel that is produced right here in Kansas.

Fuel with 5.7%-10% ethanol has been certified by the EPA to reduce carbon monoxide emmisions by up to 30%.



The US ethanol industry is the fastest growing energy industry in the world and is blended in 30% of our nation's gasoline. (From the 2004 Renewable Fuels Association's 2004 Ethanol Industry Outlook)

Utilities & Power

Improvement of Excitation System

Bowersock Mills & Power
Lawrence 785-843-1385

The Bowersock Mills & Power Company has seven hydroelectric turbines and generators. Even though this equipment dates to the 1920s, it is in very good condition. The company has been looking at ways to increase its output and one idea was to improve the efficiency of the excitation system.

Synchronous generators require a direct current (DC) source in order to create a very strong magnetic field in the rotor. It is this rotating magnetic field that creates the current in the stator and is sent along the transmission and distribution lines to the customer's home. Originally, Bowersock used an alternating current (AC) motor to turn a DC generator to create the DC. The amount of DC sent to the generator's rotor determined the quality, or power factor, of the AC generated. Too much DC and the current in the stator would lag the voltage, which the utility does not like. Too little DC and the current in the stator would lead the voltage, which the utility really likes, but for which Bowersock does not get paid for. In order to maximize output, and revenue, the voltage and current in the stator must be in step with each other. This is accomplished by adjusting the amount of DC in the rotor. The old way to do this was to install a variable resistor in the rotor circuit. By changing the value of this resistor, the current in the rotor could be adjusted until the voltage and current in the stator were in step—this is called unity power factor. This works very well; however, the variable resistor wastes energy in the form of heat. In Bowersock's case each rheostat was wasting approximately 2.5 kilowatts of energy each hour.

The first step taken to increase the excitation system's efficiency was to replace the AC motor and DC generator with solid-state devices—a fancy name for the use of diodes. Now the DC was obtained from rectified AC. The problem of being able to vary the DC in the rotor remained, so the rheostats were still used. It was discovered there was a company that manufactured motor controllers that would work very nicely. Bowersock decided to install these devices with the help of this grant.

The #1 unit was the first to receive one of these devices followed by units #6 and #7 and then units #4 and #5. At this time, a problem with surges was discovered. The fuses on the AC supply side of the devices are very sensitive. When a generator trips off-line due to a problem with its excitation, there is a very large amount of energy in the magnetic field that has to go somewhere. The diode installed to handle this was not working as well as planned. It was decided to add a resistor to the circuit, but where to find a resistor that could handle that much energy and heat? The rheostat was the logical choice. So the rheostat

was added to the diode circuit. This allowed the energy stored in the magnetic field of the rotor to be turned into heat in the rheostat. This seemed to be working quite well, so the last two devices for units #2 and #3 were installed. Early estimates on the energy savings is these devices have cut excitation requirements by 0.5% for a year. That translates into approximately 60,000 extra kilowatt-hours of electricity that is now available to customers each and every year.

Renewable Energy & Energy Efficiency Conference

Pinnacle Technology
Lawrence 785-832-8866

The 5th annual Kansas Renewable Energy & Energy Efficiency Conference was held at the Topeka Capitol Plaza on October 26 and 27, 2004. Lieutenant Governor John E. Moore delivered welcoming remarks to an estimated 300 attendees. Other noted speakers on Tuesday afternoon were: Lee Allison, Chairman Kansas Energy Council; Larry Flowers, Cochairman Wind Powering America; Blair Hamilton, Managing Director of Efficiency Vermont; and Dan York, Director of the American Council for an Energy Efficient Economy. The Tuesday session was capped off with a legislative forum featuring members of

A panel composed of members of the Kansas Senate and House Agriculture and Utilities Committees answer questions from the attendees during the Kansas Renewable Energy & Energy Efficiency Conference '04. (From right to left: Sen. Karin Brownlee, Rep. Larry Powell, Sen. Stephen Morris, Rep. Nile Dillmore, Rep. Joann Freeborn and moderator, Donna Johnson.)

the Kansas Senate and House Utilities and Agriculture Committees. This forum has been a first-day highlight of the conference for the past several years, and gives citizens the opportunity to interact with their elected representatives. The forum has received high praise from both legislators and citizens.

Following the Tuesday agenda, a reception was hosted for all attendees. This provided an excellent opportunity for networking with fellow conference goers in a relaxed atmosphere.

Wednesday was a full day of events where attendees could follow the curriculum of their choice through various breakout sessions. Nationally and regionally recognized speakers presented a wide variety of applicable topics. Wind energy, biomass energy, energy efficiency, financial assistance for projects and topics of interest to business/utilities, such as transmission, were all presented. This year's addition of energy efficiency to the presentation mix attracted a new group of conference goers: architects, facilities engineers, etc. With increasing energy costs, energy efficiency is expected to take on added importance at future conferences.

The conference's adjoining exhibit area was filled to capacity both days with displays and information from both public organizations and private businesses. The K-State Solar Car was a big hit in the exhibit area, and the team fielded questions from attendees. The friendly confines of the exhibit area let attendees meet and converse one-on-one with key people in their fields. The conference was a tremendous success whether attendees were looking for general knowledge or trying to meet and network with specific people.

Funding for the conference provided by the KEO was augmented with sponsorship money from interested businesses and organizations. Other entities provided in-kind support, such as mailing brochures and advertising in monthly newsletters. These additional revenue and support streams allowed this year's conference to become larger and more encompassing than ever.

The 2006 Conference is now being planned and will be held in Topeka in mid-September. Energy education and energy efficiency will be stressed along with renewable energy technologies. Contact Pinnacle Technology or the KEO if you are interested in attending.

Solar Lighting

Kansas Department of Wildlife & Parks
Pratt 620-672-5911

Solar lighting is the only practical and economical type of lighting for many of the state parks in Kansas. State parks are often in remote areas, sometimes far from the nearest utility source. Solar lighting not only addresses these issues, but with the continuation of national security being a priority, also addresses the issues of accessibility and safety. The following is a breakdown of those parks that received solar lighting during the FY2005 grant period. Numerous state parks are still in need of additional solar lights.

Cedar Bluff State Park, El Dorado State Park, and Wilson State Park all chose to update the main entrances to their parks with solar lighting. Often the entrances are difficult to see at night; solar lighting provides travelers a lighted sign safely directing them into the park, as

well as reminding through traffic of possible merging traffic. Lake Scott State Park addressed the need for lighting at the Americans with Disabilities Act courtesy dock located by the boat ramp. Solar lighting provides safety by illuminating the walkway and also provides security by illuminating the surrounding area, thus deterring theft and vandalism. Elk City State Park increased safety and security by illuminating a remotely located vault toilet with solar lighting. This also increases use during the late evening hours. Eisenhower State Park and Glen Elder State Park provided a light source at remote self-pay stations. These not only remind and encourage park permit purchases, but also serve as navigational markers and deter vandalism.

Solar lighting at state parks makes them accessible to citizens after dark. The boat ramp (above) at Lake Scott State Park and the information kiosk (below) are two common applications.

I have personally received many compliments on the solar lighting located at Lake Scott State Park. As a Natural Resource Officer, I am directly affected by the amount of light at the facilities located throughout the park. Without these lights, I feel vandalism and theft would be almost impossible to stop. I also feel this grant is the only option state parks have to provide a source of lighting which affects everyone who visits a Kansas state park, as well as everyone who works at a Kansas state park.

—Greg Mills, Natural Resource Officer, Lake Scott State Park

Tall Tower Phase II

Coriolis

Lawrence 785-841-1906

Modern wind turbines keep getting larger and taller. The turbines at the Montezuma Wind Farm are mounted on 60 meter towers and those being installed at the Elk River Wind Farm use 80 meter towers. Future projects may consider 100 meter, or taller, towers. Wind speeds generally increase with elevation as the friction of the earth's surface becomes less significant, but our knowledge of just how much it increases is limited. Since wind speed determines energy production and project income, an accurate estimate of wind resources is important to wind developers.

The preponderance of wind resource data available for Kansas has been collected at 10 meters from National Weather Service (NWS) sites. Data was collected at 50 meters at several sites in the late 1980's and at several others at 40 meters in the mid-1990's. Wind farm developers have also installed wind measurement systems but generally at lower elevations. Mathematically extending this data to higher elevations is part science and part projection.

Seeking to provide a better understanding of upper elevation wind resources, the Kansas Energy Office began an initiative to instrument tall towers in 2002. Funding support was acquired from DOE's Wind Powering America program and in 2003 six towers owned by the Kansas Department of Administration were instrumented. Located in Sumner, Ness, Ellsworth, Kearny, Logan, and Jewell Counties, these towers provide good geographic coverage of Western Kansas. Each tower was equipped with two anemometers and a direction vane at 50, 80, and 110 meters, as well as other climatological sensors logging data at ten minute intervals. The solar powered data system submitted data by email. The data set of record runs from July 1, 2003 thru June 30, 2005. Data is available from the Energy Office, and plans are underway to make it accessible online.

State Energy Grants

Special Projects

Trading Credits-Effects on Kansas Renewable Energy Development

Kansas University Center for Research
Kansas State University
Energy Extension Service

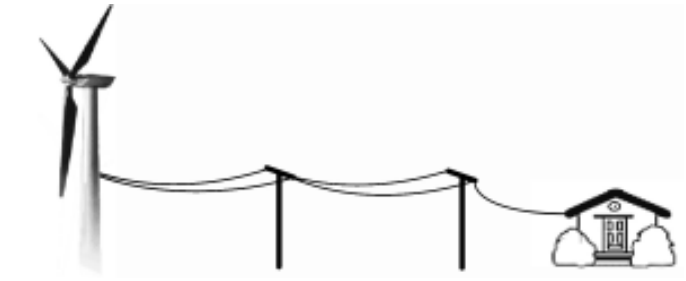
The primary goal of the Trading Credits Project was to estimate the potential monetary value associated with developing Kansas-based renewable energy resources using current and proposed renewable energy and environmental and pollution trading credit markets. Specifically, this project was concerned with providing an estimate over the next five to twenty-five years of the magnitude and value of all applicable renewable and environmental credits subject to select renewable energy development scenarios utilizing national and worldwide carbon and environmental markets. This project was viewed as Phase I of a two-phase project, with the in-depth and final analysis to be performed in the latter phase.

FutureGen

Kansas Energy Office
Topeka 785-271-3170

The Kansas Energy Office may become a partner in an exciting project being undertaken by professionals representing multiple sectors of industry, education, economic development, and advanced technologies in Kansas. Meeting at the University of Kansas in March, the group sought to develop an understanding of the U.S. Department of Energy's FutureGen program inviting states to present concepts, ideas, and site possibilities to build the world's first coal-fired, zero-emission, electric power plant.

A team of the state's energy leaders is meeting to develop the proposal to be submitted to win the FutureGen project for Kansas. This would position the state to lead the twenty-first century's energy production. Proposed is a $1 billion 275-megawatt power plant employing cutting-edge technology and serving as a large-scale engineering laboratory for testing new clean power, carbon dioxide capture, and coal-to-hydrogen technologies.



Cedar Crest Solar Lighting

Governor's Energy Initiative
Topeka 785-945-3254

In 1993, a Kansas Energy Office project installed three photovoltaic lights in a newly renovated pond and recreational area near the Kansas Executive Residence. Over the past 12 years, the PV lights had become inoperable and needed replacement bulbs, batteries and electronic controls. This project brought the three fixtures up to working condition with updated electronic controls; and replaced the bulbs and batteries.

Additionally, six solar-powered lights were installed along the public drive at Cedar Crest. Aesthetics and security/safety were among the criteria for the driveway lighting, which is used frequently by joggers, visitors to Cedar Crest and the public for weekly open houses. The new lights are so efficient they can operate over ten days without sunlight. This project provides high exposure for new PV technologies.

The public driveway at Cedar Crest is now well-lit thanks to new solar powered lights. Solar lights are excellent allternatives when grid electricity is not readily available.

ENERGY STAR® for Kansas Schools

Kansas Energy Office
Topeka 785-271-3170

Kansas schools spend nearly $360 million in Operation & Maintenance (O&M) costs annually. With rising utility costs and continual repairs to old equipment, O&M costs continue to draw funds away from the classroom. It is estimated, however, that through energy efficient improvements on existing facilities, Kansas Unified School Districts could save an estimated $29.8 million annually. These figures will only increase with the expected increases in energy costs.

Around the Office

It has been another busy year at the Kansas Energy Office. Jim Ploger, Energy Office Director, was named Kansas Corporation Commission's Employee of the Month for August, 2005. Jim continues to serve on the board of directors of the Energy Services Coalition (ESC) and the Energy Programs Consortium (EPC). Governor Sebelius appointed Jim to the Western Governor's Association Clean & Diversified Energy Advisory Committee for the 18 western states.

Jim traveled with the North American Solar Challenge in July. In a 2,500 mile race from Austin, Texas to Calgary, Alberta, Canada. Jim provided support at several 'checkpoints' along the way, including one in Topeka. Twenty university and college teams from Canada and the United States participated.

Dale Worley, C.E.M., Facility Conservation Improvement Program (FCIP) Manager, presented at the National Association of Energy Services Companies (NAESCO) in Austin, touting the benefits of the Kansas FCIP.

Jerry VanAllen, CPM, Assistant Energy Director, Dale Worley, and Jim Ploger were exhibitors at the United School Administrators meeting in Wichita to promote the benefits of the FCIP to Kansas Public school districts.

Ryan Freed, Energy Office Intern, has become the lead program organizer of ENERGY STAR® for Kansas Schools, benchmarking the energy efficiency of Kansas public school facilities. These efforts, in conjunction with Don Gilligan and the Environmental Protection Agency, have become a national pilot program for the ENERGY STAR® Portfolio Manager. Ryan is currently attending Washburn University while he works for the Energy Office.

The Energy Office continues to work with Dr. Lee Allison, the Governor's Science and Energy Policy Advisor, and the Kansas Energy Council (KEC) by providing staff support and sharing information from grantees about the status of various energy sources in Kansas.

Ruth Scott, CPM, became the main accountant for the Energy Office, and Paula Schumacher, KCC Public Affairs, continues to provide valuable support in creating brochures and other publications distributed by the Energy Office.

Kansas hosted several national conferences this year. The National Wind Coordinating Committee hosted the Southwest Power Pool Transmission meeting in Topeka; and the Central Region Clean Cities Conference hosted its annual meeting in Overland Park.

The Energy Office continues to support the National Ad Council's Energy Hog campaign. The Kansas Energy Hog has visited numerous events in the state to educate both children and adults on the benefits of energy conservation.

The Kansas Energy Office has begun a pilot program for Kansas Unified School Districts (USDs), on building energy efficiency. The ENERGY STAR® for Kansas School's program utilizes the nationally known ENERGY STAR label as an educational tool for school administrators to assess their energy use in school buildings.

The Energy Office gathers data to enter into a web-based ENERGY STAR® Portfolio Manager, developed by the Environmental Protection Agency (EPA). Using building data such as square footage, hours of operation and enrollment figures, and amount of utility usage, the Portfolio Manager program interprets the data, normalized for weather conditions, and creates a Statement of Energy Performance. The program creates a rating (from 1-100) based on the energy use to determine the energy efficiency of the building. A rating of 75 or better may qualify a facility for the ENERGY STAR® label.

After a workshop on the ENERGY STAR® Portfolio Manager with Don Gilligan, a consultant working with the EPA and the National Association of Energy Service Companies (NAESCO), the Energy Office began the pilot program to benchmark the energy efficiency of Kansas USDs.

USD Administrators can visit the Kansas Energy Office website and download the forms directly, fill them out and simply send them to the Kansas Energy Office at **www.kcc.state.ks.us/energy/energy_star.htm**, or call 785-271-3170 for more information.

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Kansas Energy Office
Kansas Corporation Commission
1500 SW Arrowhead Road
Topeka, KS 66604-4027
143-72

Facility Conservation Improvement Program

The FCIP was instituted to allow Kansas institutions to benefit from energy saving technologies. Those institutions include unified school districts, cities, counties, municipal hospitals, state colleges and universities and all state agencies. Big $$$ savings on all future energy bills by program participants will translate into lower tax bills for all citizens.

As the FCIP administrator, the KEO helps participants understand the measurement and verification process, coordinates the ESCO selection process, helps participants ask the "right" questions during the ESCO selection process, reviews the ESCO proposal for completeness and accuracy, monitors weekly construction progress, provides project oversight, helps resolve construction disputes, and monitors measurement and verification processes. If you are interested in this program contact Dale Worley, 785-271-3241, or Jerry VanAllen, 785-271-3184, at the Energy Office.

The Kansas Corporation Commission Building in Topeka is headquarters for the Kansas Energy Office.

To Apply for KEO Grant Funding

Written KEO grant proposals, including budgets, are due at the Energy Office by March 15, 2006. All proposals must be submitted with the Kansas Energy Program Application for Assistance available online at **www.kcc.state.ks.us**. For details, contact Jerry K. VanAllen at 785-271-3184.

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